TEXAS PARKS & WILDLIFE

April 14, 2005

Ms. Faith Hambleton
Manager, TMDL Section (MC 203)
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

Re: Dioxin in the San Jacinto River at the Interstate Highway-10 Bridge

Dear Ms. Hambleton:

The Texas Parks and Wildlife Department (TPWD) is the agency with primary responsibility for protecting the state's fish and wildlife resources (Texas Parks and Wildlife Code §12.0011(a)). Furthermore, TPWD is charged with providing information on fish and wildlife resources to any local, state, and federal agencies or private organizations that make decisions affecting those resources (Texas Parks and Wildlife Code §12.0011(b)(3)). In view of this mandate, we wish to share some information that has recently come to light regarding dioxin concentrations in San Jacinto River sediments. We are aware that this information may be relevant to more than one program at the Texas Commission on Environmental Quality (TCEQ) and we request your assistance in ensuring that appropriate measures are taken to ensure protection of fish and wildlife resources.

TPWD has recently become aware of information that suggests that there are old waste pits in a sandbar in the San Jacinto River just north of the Interstate Highway-10 (I-10) bridge. Please see Appendix A for recent and historical photographs and maps of the area. Anecdotal evidence suggests that the pits were used from the mid-1960's until about the mid-1970's for disposal of papermill waste. High levels of dioxin in water, sediment and tissue samples collected recently and in the 1990's support this interpretation. (See Appendix B.)

We have discussed this matter with your staff, staff of several other programs at TCEQ and of other agencies and were amazed to learn that no one seemed to be aware of this site. We bring this information to your attention at this time with the hope that action can be taken to address what appears to be a significant threat to aquatic resources and human health. We request that steps be taken to:

1) investigate the situation to confirm or refute the presence of contaminants,
2) prevent further spread of contaminants, if their presence is confirmed, and
3) remediate the site, if the presence of contamination is confirmed.

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The potential presence of sediment contamination is an immediate concern as the San Jacinto River near the I-10 bridge is very active with respect to dredging, mining and construction. These activities may be spreading potentially contaminated sediments or resuspending dioxins in the water column. See Appendix C for a list of U.S. Army Corps of Engineer (USACE) Dredge and Fill Permits in this area. The USACE does not typically require sediment testing prior to permit approval unless a contamination problem has been confirmed.

In the longer term, we are concerned that this area may be a significant source of contamination for the Houston Ship Channel and Upper Galveston Bay ecosystem. Fishing advisories are already in place for this area. We support TCEQ's efforts to address the situation through a Total Maximum Daily Load (TMDL) project. We hope that this new information can be incorporated into the existing TMDL study.

While it is probably beyond the scope of the TMDL program to initiate investigation and remediation of a contaminated site, we understand that funds for this purpose may be available through the Preliminary Assessment-Site Investigation program in the Remediation Division. We request that you contact the Remediation Division with your recommendation that this site be investigated as part of the Federal Superfund Site Discovery Program.

We appreciate your assistance in addressing this environmental concern. Please feel free to contact Dr. Patricia Radloff at 512-912-7030 if you have questions or need more information.

Sincerely,

Larry D. McKinney, Ph.D
Director, Coastal Fisheries Division

LDM:PR:dh

Enclosures

cc (w/enclosures):
Tom Weber, TCEQ, Manager, Water Section, Chief Engineer's Office (MC 203)
Larry Koenig, TCEQ, TMDL Section (MC 203)
Jackie Hardee, TCEQ, Director, Remediation Division (MC 225)
Wes Newberry, TCEQ, Site Investigation Team (MC 142)
Vickie Reat, TCEQ, Remediation Division (MC 168)
Richard Seiler, TCEQ, Natural Resource Trustees Program Team (MC 142)
Patrick Roques, TCEQ, Surface Water Quality Monitoring Team (MC 165)
Mark Fisher, TCEQ, Water Quality Assessment Section (MC 150)
Jim Davenport, TCEQ, Water Quality Standards Team (MC 150)
Charles Bayer, TCEQ, Water Quality Standards Team (MC 150)

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Carl Masterson, Houston-Galveston Area Council, P. O. Box 22777, Houston, TX 77227-2777
Jim Adams, General Manager, San Jacinto River Authority, 1577 Damsite Rd., Conroe, TX 77034
Hanadi Rifai, University of Houston, Dept. of Engineering, 4800 Calhoun Rd., Houston, TX 77204
Randy Palachek, Parsons, 8000 Centre Park Dr., Austin, TX 78754
Paul Jensen, PBS&J, 6504 Bridge Point Pkwy., Austin, TX 78730

APPENDIX A

Maps and Aerial Photographs of the San Jacinto River at I-10

This sequence of maps and photos shows the history of this area of the San Jacinto River. The 1955 topographic map shows a clearly delineated channel of the San Jacinto River prior to subsidence. Note that no waste pits appear on this map. The 1967 topographic map shows what could be waste pits just north of the I-10 bridge. In the 1982 topographic map and aerial photograph, much of the land area north of I-10 has been submerged due to subsidence.

Figure 1. 1955 Topographic Map

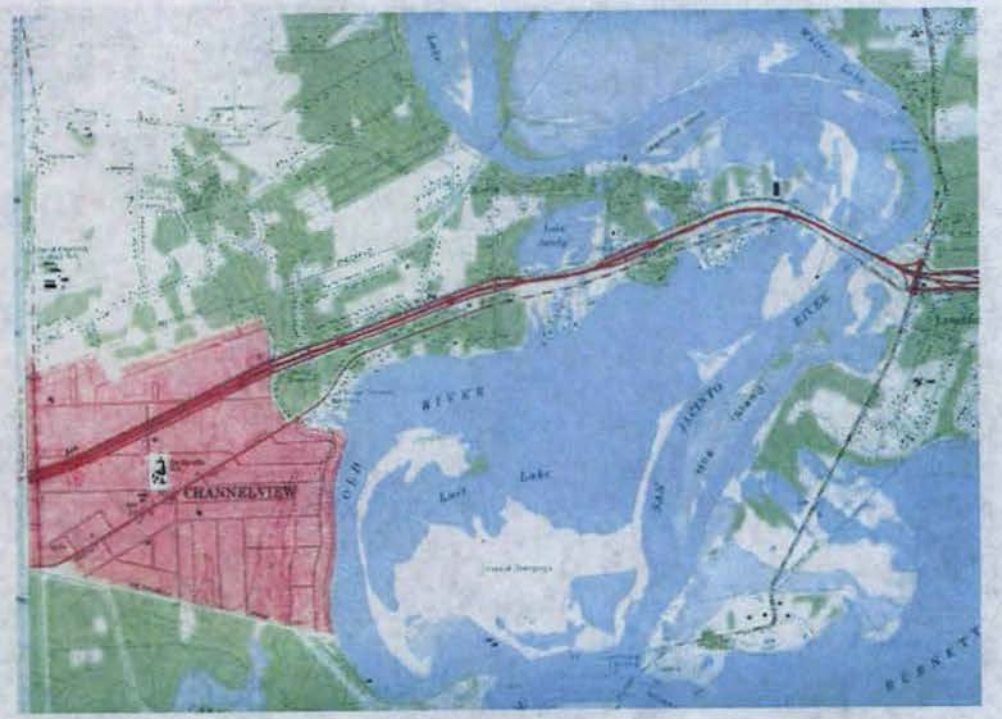

Figure 2. 1967 Topographic Map

Figure 3. 1982 Topographic Map

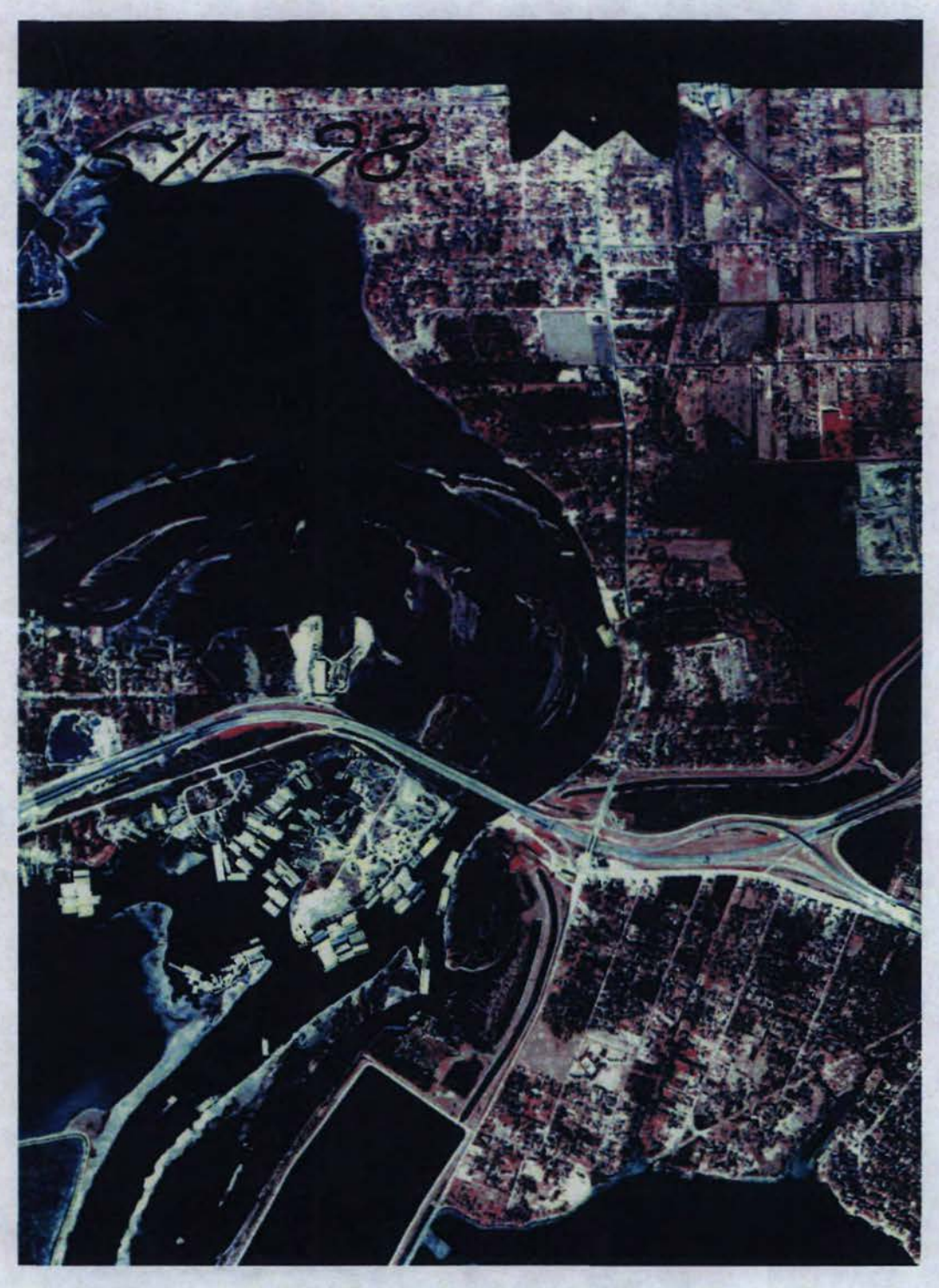

Figure 4. 1982 Aerial Photograph

Figure 5. 2005 Aerial Photo

In Figure 5, the green polygon shows the general presubsidence upland and tidal flat configuration. This outlined area, excepting the two islands, is permitted for additional sand mining under USACE permit 19284(03), which is in the process of being renewed. The tan polygon indicates the area recently dredged for sand. The sand was processed on the adjacent high ground and much of the finer sediment (silts and clays) has washed back into the excavated hole. The blue polygon indicates where clayey material from the mining was placed and is now being spread out onto the existing tidal flat to create a marshland as required by USACE permit 19284(03). The red polygon shows the approximate configuration of the waste pit as depicted on the 1967 topographic map. The red circle indicates the approximate location of the 1994 sediment sample point that had high dioxin levels.

APPENDIX B

Water, Sediment and Tissue Data for the San Jacinto River at I-10

Published data support the potential existence of a dioxin source at the San Jacinto River at I-10. Work done as part of the Houston Ship Channel Toxicity Study in the 1990s and recent work done as part of the Houston Ship Channel dioxins TMDL show elevated levels of dioxin in water, sediment and tissue samples. A summary of relevant data is provided below.

Houston Ship Channel Toxicity Study [1]

The Houston Ship Channel Toxicity Study sampled twice in the San Jacinto River at I-10. Water samples taken there did not show any exceedances of criteria with the exception of one value for copper (Table 4.2-1). Fish and crab tissue samples taken at the station showed the presence of dioxins and furans in addition to Aroclor 1260, Benzidine, and Chrysene (Table 4.2-1). Values for dioxins and furans were high, with TEQ values of 2.31 ng/kg in blue catfish and 2.47 ng/kg in crabs (Table 3.2-16).

Sediment samples showed significant values for dioxins and furans, with TEQs of 46.1 ng/kg in August 1993 and 27.2 ng/kg in May 1994 (Table 3.2-12 and Figure 4.2-17). These were among the highest values observed in the study. Discussion in the report indicates, "the high TEQs obtained for sediments collected from ... the San Jacinto River at Interstate 10 cannot be explained with available information. ... Catfish and crabs collected from the San Jacinto River upstream of the Interstate 10 bridge also have relatively high [2,3,7,8-tetrachloro-dibenzo-*p*-dioxin (TCDD) equivalent concentrations] TEQs. However, the contamination appears to be restricted to that site in the river and is not associated with the contamination observed in the channel" (Pages 5-2, 3).

TMDL for Dioxins

More recent data collected as part of TCEQ's TMDLs for dioxins indicate the continued presence of dioxin contamination in the San Jacinto River at the I-10 bridge. The TMDL study includes sampling of water, sediment and tissue beginning in 2002. The Final Report for Work Order No. 4, published in October 2003 [2], includes data for summer 2002, fall 2002 and spring 2003 for station 11193, located in the San Jacinto River at the 1-10 bridge. (See Figure 6.) The sampling at this station occurred during or shortly after the sand mine was in operation and the results suggest that the mining may have exacerbated the existing problem identified in the 1994 study.

Quoting from the text of the report, "The highest dioxin concentrations for the fall [2002 water] samples were found at stations 11193 (segment 1001) and 15979 (segment 1006); while in Spring 2003, stations 11193 and 11261 exhibited the highest TEQs in water" (p. 92).

"The highest TEQ levels were measured in [sediment] samples from locations 15979 (segment 1006) and 11193 (segment 1001) during the Summer 2002 event and from locations 11292 (segment 1007) and 11193 (segment 1001) during Fall 2002. Location 11193 had the highest dioxin concentration in water as well. In-channel locations 11193 (segment 1001) and 16618 (segment 1005) exhibited the highest dioxin levels [in sediment] during the Spring 2003 sampling event" (p. 98).

Regarding all collected fish and shellfish tissue samples, "It is noted that the health-based standard of 0.47 ng TEQ/kg (derived from the Texas Water Quality Standards) was exceeded in 97% of the fish samples and in 95% of the crab samples" (p. 104). For all the 2002 and 2003 sampling events, "Station 11193 in the San Jacinto River (segment 1001) exhibited the highest average TEQ in water and the third highest TEQ in sediment" (p. 149, Figure 4.44 and Table 4.47).

The following table summarizes the data for station 11193 [2]:

	Summer 2002	Fall 2002	Spring 2003	Reference	Average of all samples (Table 4.47)	Rank (Table 4.47)	Site-Specific Target (p.32)
Water[3] (TEQ pg/L)	0.4661	2.6720	3.0948	Table 4.13	2.078	1	0.0933 pg TEQ/L (Water Quality Standard)[1]
Sediment (TEQ ng/kg dry wt)	103.23	63.89	138.96	Table 4.19	102.028	3	
Sediment (TEQ ng/kg organic carbon-normalized)	19117.13	10473.61	16543.27	Table 4.19			470 ng TEQ/kg OC (organic carbon-normalized)[2]
Fish tissue (TEQ ng/kg wet wt)	13.117	4.845	5.734	Table 4.23	7.898	13	0.47 ng TEQ/kg
Crab tissue (TEQ ng/kg wet wt)	5.519	1.361	4.490	Table 4.24	3.790	18	0.47 ng TEQ/kg

1 – Preliminary, estimated site-specific targets for water were estimated in [2, p. 32] as 0.027 pg TEQ/L (TCEQ) or 0.191 pg TEQ/L (TDH).
2 – Preliminary, estimated site-specific target for sediment.
3 – Total concentration in water obtained by summing dissolved and suspended concentrations [2, p. 92].

Data evaluation, collection and modeling is included as part of Work Order No. 7. Quarterly report No. 1 [3] presents results of preliminary modeling done to ensure that all processes and sources have been identified. Quoting from the report, "A preliminary mass balance of dioxin in the Houston Ship Channel was completed using the QUAL-TX model for the system. Results indicate that the quantified runoff and point source loadings account for only 26% of the total loadings to the Houston Ship Channel" (p. 55). "The modeled concentrations are lower than the measured ones in some reaches. Observed concentrations in the vicinity of stations 15979 and 11193 are elevated and could not be matched using data from known sources even when adjusting all model parameters ... an additional source would have to be entered in the vicinity of station 11193 to match the peak observed at that location. Possible unquantified sources include road runoff, groundwater leachate, dredged material leachate, and localized contaminated sediments" (p. 47). This inability to accurately model station 11193 is also noted in Quarterly Report No. 2 [4], which states, "Similar to what was observed with the TEQ model, measured concentrations in the vicinity of stations 15979 and 11193 are elevated and could not be matched using data from known sources even when adjusting all model parameters" (p.89).

Additional sampling was conducted in Spring 2004 [5]. For the water samples, "The highest TEQ levels [in the spring 2004 sample] were measured at stations 11193 (segment 1001) and 15979 (segment 1006)" (p. 41-2). "The [total water] dioxin concentration at station 11193 in the San Jacinto River (segment 1001) is higher than those measured at the confluence with the main channel and higher than that measured at station 15979. The profile is similar to that seen in previous sampling events" (p. 122). Station 11193 had high values for sediment samples as well in the Spring 2004 sampling event. "The highest [sediment] TEQ levels were measured in samples from locations 11280 (segment 1007) and 11193 (segment 1001)" (p. 42). "Dioxin concentrations were low for most of the locations (upstream and downstream of station 11280). Sediment TEQ concentration for station 11193 in the San Jacinto River (segment 1001) was the only exception, with a concentration as high as that measured at station 11280 (segment 1007)" (p. 124). For fish and shellfish tissue, "The health-based standard of 0.47 ng TEQ/kg ... was exceeded in 96% of the catfish samples (27 out of 28) and in 96% of the crab samples (25 out of 26)" (p. 50). The report concludes that "regardless of regulatory changes to reduce levels of dioxins, sediment and tissue data for the Houston Ship Channel suggest that there has been little change in total TEQ over time" (p. 292).

Data for summer 2004 sampling were reported in Quarterly Report No. 5 [6]. In summer 2004, shallow and deep water samples were taken in the San Jacinto River at I-10. "Analysis of water samples ... showed consistently higher dioxin concentrations for the deep samples than for the shallow ones" (p. 61). Sediment samples were taken upstream and downstream in the vicinity of station 11193 to try to locate unidentified major sources (p. 31 and Figure 3.8). At station 18389, about 1 kilometer upstream of 11193, and at station 18390, about 1 kilometer downstream of 11193, sediment values were high. "Both 2378-TCDD and TEQ [sediment] levels at station 18389 (~1 km upstream of station 11193) are significantly higher than those observed at the remaining locations in segment 1001, which might suggest the presence of an identified source of 2378-TCDD" (p. 33).

Figure 6. Location of stations used in Summer 2004 sediment sampling. (Figure 3.8 from [6].)

The following table summarizes the 2004 data for station 11193 [5] and [6]:

	Spring 2004 [5]	Summer 2004 [6]	Fall 2004 (Data not yet available)	Reference	Average of all samples (Table 4.9 [5])	Rank (Table 4.9 [5])	Site-Specific Target [2, p.32]
Water[2] (TEQ pg/L)	1.2524 (average of two values)	1.4484 (shallow) 2.3318 (deep)		Table 3.9 [5] Table 3.6 [6]	1.871	1	0.0933 pg TEQ/L (Water Quality Standard)
Sediment (TEQ ng/kg dry wt)	91.27	55.13 (average of two values)		Table 3.12 [5] Table 3.7 [6]	99.338	4	
Sediment (TEQ ng/kg dry wt)	---	At 18389 (upstream) 15.96		Table 3.7 [6]			
Sediment (TEQ ng/kg dry wt)	---	At 18390 (downstream) 11.66		Table 3.7 [6]			
Sediment (TEQ ng/kg organic carbon-normalized)	19013.54	4825.95 (average of two values)		Table 3.12 [5] Table 3.7 [6]			470 ng TEQ/kg OC (organic carbon-normalized)[1]
Sediment (TEQ ng/kg organic carbon-normalized)	---	At 18389 (upstream) 3711.40		Table 3.7 [6]			470 ng TEQ/kg OC (organic carbon-normalized)[1]
Sediment (TEQ ng/kg organic carbon-normalized)	---	At 18390 (downstream) 2082.23		Table 3.7 [6]			470 ng TEQ/kg OC (organic carbon-normalized)[1]
Fish tissue (TEQ ng/kg wet wt)	5.08			Table 3.13 [5]	7.193	12	0.47 ng TEQ/kg
Crab tissue (TEQ ng/kg wet wt)	3.35			Table 3.14 [5]	3.679	18	0.47 ng TEQ/kg

1 – Preliminary, estimated site-specific target for sediment.

2 – Total concentration in water obtained by summing dissolved and suspended concentrations [5, p. 31]

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APPENDIX C

Dredging, Mining and Construction Activity in the San Jacinto River near I-10

The San Jacinto River near the I-10 bridge has seen a great deal of dredging, mining and barge berth construction activity in recent years. Based on evidence presented in Appendix B, it is likely that much of this activity has shifted contaminated sediment. TPWD understands in most cases when dredging is occurring that the material is mechanically (dragline) dredged and then placed on the adjacent property to dewater. It is then used to elevate construction sites above the flood level.

The following table lists some recent issued and pending Army Corps of Engineers permits for this area:

Permit Number	Date of Notice	Status	Applicant	Location	Activity
22776	12/17/2002	Awarded	Joseph Dunn	San Jacinto River – 1 mile above I-10	Dredge and Fill
21836(01)	3/3/2003	Awarded	Orion Construction	Old River – 1 mile below I-10	Dredge and Fill
22941(01)	4/22/2003	Awarded	TH Investments	San Jacinto River – 1 mile below I-10	Barge Mooring
20709(03)	8/12/2003	Unknown	Kirby Inland Marine	Old River – 3 miles below I-10	Barge Mooring
21156(02)	7/14/2004	Unknown	Cheryl K. Inc.	Old River – 2.5 miles below I-10	Barge Mooring
23522	9/1/2004	Unknown	Ballard Exploration	At Old River and San Jacinto River, 4000 ft below I-10	Oil Well Installation
22941(02)	12/20/2004	Unknown	TH Investments	San Jacinto River – 1 mile below I-10	Barge Mooring
23601	12/27/2004	Unknown	TH Investments	San Jacinto River – 1 mile below I-10	Barge Mooring
23702	3/22/2005	On Notice	MGI Trading Inc.	Old River – 2.5 miles below I-10	Barge Mooring
19824(04)	---	Pending	Houston International Terminal	Envelopes the suspected waste pit site	Sand Mining and Processing
Not yet available	---	In preparation	Not yet available	Immediately below the I-10 bridge	Dredge and Fill

Figure 8 depict locations of the permits listed above. Note that some permits for Old River have been included in this listing. TPWD believes that during high flow conditions water flows directly under I-10 and into both the San Jacinto River and Old River. Blue arrows depict the direction of flow. It is possible that sediments in Old River may be contaminated with dioxin as well.

Figure 9 depicts a close-up of splays that result from tugboat propwashing as tugboats manuever barges in and out of shallow waters. This photo is an enlargement of the barge mooring seen at the bottom center of Figure 8. This type of activity could contribute to resuspension of sediments and high concentrations of dioxin in the water column.

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Figure 8. Location of some recent USACOE permits (yellow circles) in the vicinity of the San Jacinto River, Old River and the I-10 bridge. Blue arrows depict river flow during flood events. Water flows directly under the I-10 bridge and into both the San Jacinto River and Old River.

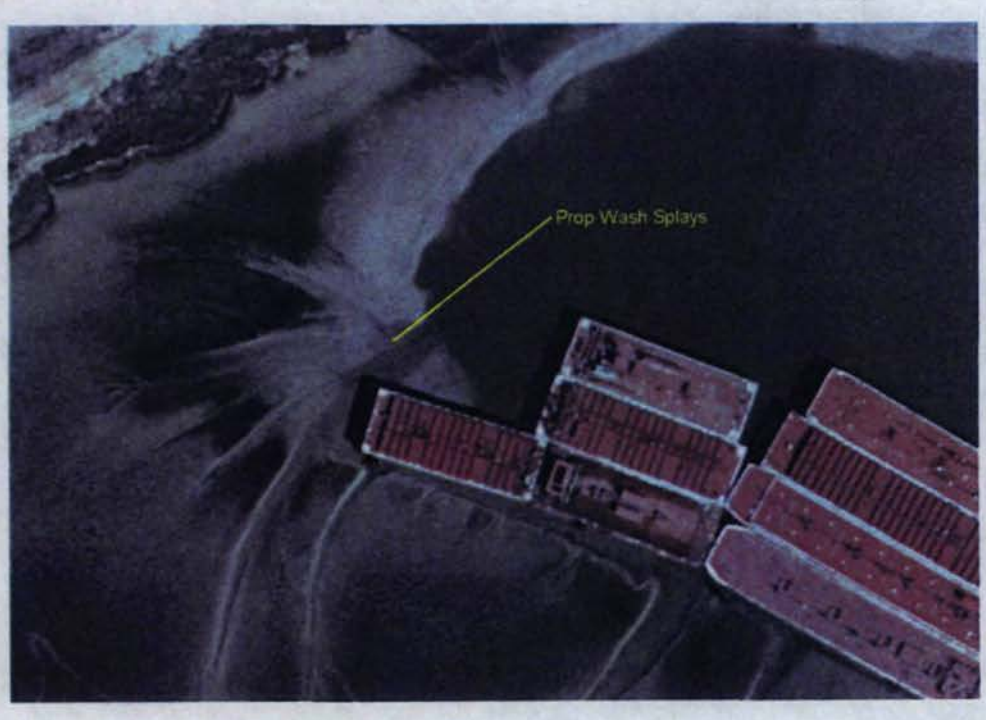

Figure 9. Example of prop wash splays from barge berthing activities.

APPENDIX D

References

1. Houston Ship Channel Toxicity Study Project Report, ENSR Consulting and Engineering, July 1995. ENSR Document No. 1591R001.01.

2. TMDLs for Dioxins in the Houston Ship Channel, Contract No. 582-0-80121, Work Order No. 582-80121-04, Final Report, October 2003, University of Houston, Parsons Engineering and PBS&J.

3. TMDLs for Dioxins in the Houston Ship Channel, Contract No. 582-0-80121, Work Order No. 582-80121-07, Quarterly Report No. 1, January 2004, University of Houston, Parsons Engineering and PBS&J.

4. TMDLs for Dioxins in the Houston Ship Channel, Contract No. 582-0-80121, Work Order No. 582-80121-07, Quarterly Report No. 2, April 2004, University of Houston, Parsons Engineering and PBS&J.

5. TMDLs for Dioxins in the Houston Ship Channel, Contract No. 582-0-80121, Work Order No. 582-80121-07, Quarterly Report No. 4, November 2004, University of Houston, Parsons Engineering and PBS&J.

6. TMDLs for Dioxins in the Houston Ship Channel, Contract No. 582-0-80121, Work Order No. 582-80121-07, Quarterly Report No. 5, January 2005, University of Houston, Parsons Engineering and PBS&J.

For references 2-6, see http://www.h-gac.com/HGAC/Programs/Water+Resources/Total+Maximum+Daily+Loads+TMDL+/Dioxin+TMDL/Download_Central.htm

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